2-21-92-F-350

SUMMARY
BIOLOGICAL OPINION ON THE EFFECTS TO GILA TOPMINNOW
FROM THE
CANELO PASS TO PATAGONIA SEGMENT OF THE
ARIZONA TRAIL

Date of the opinion: December 23, 1992

Action agency: U.S. Forest Service, Coronado National Forest

Project: Construction and use of the Arizona Trail from Canelo Pass to Patagonia, Santa Cruz County, Arizona

Listed species affected: Gila topminnow (Poeciliopsis occidentalis)

Biological opinion: Non-jeopardy

Assumptions underlying analysis: The grazing management systems, road closures, and livestock exclosures which are part of the Redrock Action Plan will be in place prior to opening of the Canelo Pass to Patagonia segment of the Arizona Trail. If this assumption is not filled, then formal Section 7 consultation on the Arizona Trail must be reinitiated. (Page 6)

Incidental take Statement:

Level of take anticipated: Five measures of incidental take are given. These are based on detection of short and long-term impacts to the riparian and aquatic habitats. Occurrence of any of the five items will exceed anticipated take and formal Section 7 consultation must be reinitiated. (Pages 12 and 13)

Reasonable and prudent measures: Four objectives for minimizing incidental take are given. Implementation of these measures, through the Terms and Conditions, is mandatory. (Page 13)

Terms and conditions: Terms and conditions implement the reasonable and prudent measures and are mandatory requirements. Terms and conditions include requirements for minimizing disturbance within the stream channel during any construction or maintenance work; avoiding introduction of pollutants into stream channels; enforcement of the no-camping restrictions; biannual inspection and maintenance of livestock exclosures; compilation of written records on trail construction, maintenance, and use data; monitoring; and submission of reports on various aspects of the trail to the Fish and Wildlife Service and Arizona Game and Fish Department. (Pages 13 to 15)

Conservation recommendations: Select Alternative 8. Implementation of conservation recommendations is discretionary. (Pages 15 to 17)

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DEPARTMENT OF THE INTERIOR
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2-21-92-F-350

December 23, 1992

Larry Henson, Regional Forester
U.S. Forest Service
517 Gold Avenue, SW.
Albuquerque, New Mexico 87102

Dear Mr. Henson:

This letter responds to your request of November 4, 1992, for formal consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, on the Canelo Pass to Patagonia Segment of the Arizona Trail. The 90-day consultation period began on November 9, 1992, the date your request was received in our office. The species of concern in this biological opinion is Gila topminnow (Poeciliopsis occidentalis). On September 29, 1992, the Fish and Wildlife Service (FWS) concurred with your finding of "no effect" to the lesser long-nosed bat (Leptonycteris curasoae verbabuenae) from this proposed project. Enclosed with this biological opinion is an executive summary, which we believe you may find helpful.

The following biological opinion is based on information provided in the September 11, 1992, biological evaluation (BE), the 1992 draft environmental assessment (EA), two meetings and one site visit with Sierra Vista Ranger District staff, data in our files, and other sources of information.

BIOLOGICAL OPINION

It is my biological opinion that the Canelo Pass to Patagonia segment of the Arizona Trail is not likely to jeopardize the continued existence of Gila topminnow.

BACKGROUND INFORMATION

Species Description

Gila topminnow was listed as an endangered species on March 11, 1967. No critical habitat has been designated for this species. Gila topminnow is a small, one to two-inch long, livebearing fish (Minckley 1973) of the family Poeciliidae. It occurs in the Gila, Sonora, and de la Concepcion River drainages in Arizona, New Mexico, and Sonora, Mexico (Minckley 1973, Vrijenhoek et al. 1985). The species was once one of the most common fishes in the Gila River and its tributaries (Hubbs and Miller 1941). Destruction of its habitat through water diversion, stream downcutting, backwater draining, vegetation clearing, channelization, water impoundment, and other human uses of natural resources; plus competition with and/or

predation by nonnative fish species, most notably mosquitofish (Gambusia affinis), have resulted in extirpation of Gila topminnow throughout most of its range (Meffe et al. 1983, USFWS 1984). At present, Gila topminnow is known from only 9 naturally occurring populations in the United States and about 20 reintroduced populations.

Redrock Canyon supports one of only two relict natural populations of Gila topminnow existing on public lands today. The Gila topminnow population in Redrock Canyon was discovered in the late 1960's (Rinne et al. 1980). Gila topminnow occupies the perennial stretches of water in Redrock Canyon in the Falls (Redrock Ranch) area (T. 22 S., R. 16 E., S1/2 sec. 2 and NE1/4 sec. 11), the Gate Spring area (T. 22 S., R. 17 E., SE1/4 sec. 7), and the tributary below Cott Tank (T. 22 S., R. 17 E., sec.s 16, 21, and 22), expanding into other areas of the stream and its tributaries during times of plentiful surface water (Simons 1987, Stefferud 1989, Bagley et al. 1991). Although numbers of Gila topminnow present and length of habitat occupied at any given time fluctuate, the population in Redrock Canyon has remained relatively large and healthy since its discovery. This is particularly important in light of the fact that mosquitofish has been recorded from this watershed since 1979 (Simons 1987, Bagley et al. 1991, FWS unpublished data). Presence of mosquitofish is usually extremely detrimental to survival of Gila topminnow, often to the point of eliminating it from a site within a few months (Minckley et al. 1977, Meffe et al. 1983, Galat and Robertson 1992). Other nonnative fish species are also present in Redrock Canyon and adversely impact Gila topminnow. Largemouth bass (Micropterus salmoides) is present in the Cott Tank drainage and feeds on smaller fish including Gila topminnow. Pools containing largemouth bass are generally devoid of other fish. Bluegill (Lepomis macrochirus) has been taken in the canyon and there are anecdotal reports of "trout" and "goldfish."

As one of the larger of the nine remaining natural Gila topminnow populations, Redrock Canyon is very important to the survival and recovery of the species. Its Federal ownership and coexistence there of Gila topminnow with mosquitofish, increase the importance of Redrock Canyon in the conservation of Gila topminnow. Federal ownership provides greater protection through section 7 of the Act and allows more opportunity for recovery actions. The coexistence of Gila topminnow and mosquitofish there may hold information vital to the survival and recovery of Gila topminnow throughout its range. New activities in Redrock Canyon that would adversely affect Gila topminnow could seriously compromise the recovery of this species.

Project Description

The proposed project area is located east of the town of Patagonia, Santa Cruz County, Arizona on the Sierra Vista Ranger District of the Coronado National Forest. The proposed action is to construct the Canelo Pass to Patagonia segment of the Arizona Trail. This segment would be about 12 miles long. The segment would begin at Forest Development Road (FDR) 799 approximately 3/4 mile north of Canelo Pass (T. 22 S., R. 18 E., NW1/4 sec. 19) and descend through Redrock Canyon (Figure 1). It would leave Redrock Canyon below the Redrock Ranch (T. 22 S., R. 16 E., NE1/4 sec. 11) and join the Harshaw Canyon road (Forest Road [FR] 58) near its junction with FR 139. Estimated project cost is $26,500 and yearly maintenance costs are expected to be $8,500.

When completed, the Arizona Trail would provide a continuous route from the U.S./Mexico to the Arizona/Utah boundary. It was conceived in 1987 by a private citizen and is being actively promoted by private groups. The Arizona Trail would join a system of trails through other States that would link the Mexican and Canadian borders. It would use State, Federal, and private lands. The trail would be open for use by hikers, horses and packstock, and non-motorized mountain bikes. The trail has been completed from the Arizona/Sonora border to Canelo Pass. The route of the trail continuing north from Patagonia has not yet been selected, but is expected to pass through the Coronado National Forest in the Santa Rita Mountains.

Twelve alternative routes were considered for the Canelo Pass to Patagonia segment, with nine being carried through the planning process (Figure 2). All alternatives began at the same site on Canelo Pass. Primary end points of trail alternatives were the towns of Sonoita or Patagonia. Alternatives leading through the Canelo Hills to Sonoita were dropped from consideration early in the process due to difficulties in trail routing. Of the remaining nine alternatives, three did not enter Redrock Canyon and two others had only short lengths in Redrock Canyon. Reasons for non-selection of various alternatives included lack of easements across private lands, neighboring private landowner objections, effects to cultural resources, safety problems, aesthetics, cost, effects to lesser long-nosed bat, effects to Mexican spotted owl (Strix occidentalis lucida), and effects on riparian areas, not necessarily in that order.

The proposed project would be expected to increase recreational use in the area. Projected trail use is from 300 to 1,728 people per year, with or without horses and packstock. These figures are based on use of already constructed portions of the trail in northern Arizona. No figures are available for existing recreational use in the area, however use appears to be light to moderate. Types of current use include hunting, horseback riding, dispersed camping, and tour groups. The trail would be promoted by the Forest Service through a brochure, radio and newspaper announcements, and signs, with an emphasis on ethical trail use. It would also receive publicity through private groups promoting the Arizona Trail.

Of the approximately 12 miles of trail in the Canelo Pass to Patagonia segment, only 4 miles would be new construction. The remainder of the segment would follow existing vehicle roads or tracks. In the new construction areas the trail would be cleared to mineral soil and range from 18 inches to 3 feet in width. Drainage bars would be installed where needed. Tread work on the existing roads and tracks would be done only where the route needs definition. Pruning of brush and trees would occur along the entire route only when necessary to remove obstructions encroaching on the trail. Walk-through gates for hikers and "horse gates" for riders would be placed in existing fencelines, preferably using on-site materials such as juniper trees. The proposed route for the trail mostly follows gently sloping two-track roads. Slopes are steeper where new construction will drop the trail into the canyon and as it climbs out of the canyon over two ridges. Here, the average slope will approach 8 percent grade.

Parking at the upper trailhead is already planned as part of the Parker Lake to Canelo Pass segment of the trail. Parking at the lower trailhead would be at a site already used for recreation. Both parking areas would accommodate about six passenger vehicles and two four-horse trailers. No

water development or campsites are proposed along the trail. Sanitary facilities may be considered in the future at parking areas and could be installed when other options are not available. Hikers would carry water or use existing water sources and horse and packstock would use existing water sources on the trail.

The trail would be patrolled and litter removed by volunteer groups and a seasonal Recreational Technician, if funding permits. No other specific patrol or law enforcement measures are planned. Trail maintenance, such as brushing, rebuilding, and tread maintenance, would be accomplished through joint efforts of individual and group volunteers and the Forest Service.

The proposed project would include several measures to avoid or minimize adverse effects to wildlife, riparian, and cultural resources. These include closure of specific areas to motorized vehicles, mountain bikes, and camping (Figure 1). In addition, mountain bikes would not be permitted off the designated roads and trails. For the protection of the lesser long-nosed bat, the location of Bat Cave Tank would be removed from all future maps prepared by the Forest Service. The Forest Service would also request the U.S. Geological Survey to remove the location of the cave from their topographic maps.

A locked gate would be placed across FR 4641 as a protective measure for lesser long-nosed bats. Only administrative use and operations associated with the livestock grazing allotment would be permitted on FR 4641 and 4642. Mountain bikes would not be allowed on either road except for the 1/4 mile stretch of FR 4642 that would be part of the Arizona Trail. Closures would be posted at the Forest boundary and at the trail junctions with FR 4642. Signs and rocks or scattered brush would also direct users along the trail at these junctions. Mountain bikes would also be restricted from Kunde Mountain.

An unnumbered road that connects FR 4625 with Harshaw Canyon at the Bergier Place (T. 22 S., R. 16 E., sec. 23) would be closed to motor vehicles, but not to mountain bikes. The closure would be posted at both ends of the road. Other areas to be closed to motor vehicle use, but open to mountain bike use, include FR 4629 to Down Under Tank (T. 22 S., R. 17 E., SE1/4 sec. 15) and the valley bottom of Redrock Canyon from Red Bank Well (T. 22 S., R. 17 E., NW1/4 sec. 17) downstream to Redrock Well (T. 22 S., R. 17 E., NW1/4 sec. 7). The valley bottom closure was also part of the June 1990 Redrock Action Plan.

No camping zones would be designated near wet areas and archeological sites (Figure 1). The no-camping zones would include the interior of three exclosures being constructed around the perennial stream stretches in the Cott Tank drainage, Gate Spring, and the Falls area; a 3/4 mile reach of canyon below the lower end of the Cott Tank exclosure (below Silver Tank); and the canyon bottom for about 1/4 mile above the upper end of the Falls exclosure (below Redrock Ranch). The exclosures are part of the June 1990 Redrock Canyon Action Plan for which a biological opinion was issued on November 29, 1990. The Cott Tank drainage exclosure is now under construction and funding is available for the other two exclosures (Tom Deecken, U.S. Forest Service, pers. comm., November 14, 1992). Existing vehicle tracks, FR 765, and FR 138 within the exclosures would be closed to motorized vehicle and mountain bike use.

Monitoring trail effects on natural resources is part of the proposed project. For Gila topminnow and other riparian-dependent species monitoring would include measures of streambank stability; riparian stand age-class, composition, canopy cover, and vigor; changes in ground cover; compliance with camping and vehicle use regulations; and recreation use levels. Permanent photopoints and transects would be established and monitored every year and a traffic counter would be installed just below Silver Tank (T. 22 S., R. 17 E., center sec. 16). If monitoring determines that trail use is preventing riparian recovery or affecting habitat of Gila topminnow, the FWS and Arizona Game and Fish Department (AGFD) would be contacted to discuss possible management changes.

For lesser long-nosed bats, monitoring would consist of installation of a trail-use counter between Harshaw and Redrock Canyons, consideration of metal-detecting sensors at the entrance to the bat roost, yearly inspection of the roost for evidence of entry and bat harassment with photo points inside the roost, a yearly bat exit count, and a yearly population estimate inside the roost in conjunction with the exit count if permitted by the FWS. Cave myotis (Myotis velifer brevis) would also be monitored as part of the lesser long-nosed bat monitoring. Nearby areas would be surveyed for roosts of the Mexican long-tongued bat (Choeronycteris mexicanus). Results of bat monitoring would be reviewed yearly with the FWS, AGFD, and knowledgeable bat biologists to determine the need for further protection measures.

The EA also suggests two potential cultural interpretive activities in the project area. These include interpretation at the Silver Tank adobe structure and arrastra and a side trail to the Gate Spring rock art site.

EFFECTS OF THE ACTION

Environmental Baseline

Redrock Canyon supports a rich diversity of natural resources in addition to numerous human activities. In addition to Gila topminnow and lesser long-nosed bat, at least 15 other sensitive species are either known from, or potentially occur in, the watershed. Human uses include prehistoric occupation, and historic and present livestock grazing, mining, water development, roads, hunting, and general recreation. These uses have resulted in changes to the watershed that have adversely affected Gila topminnow and resulted in a degraded environmental baseline. Analysis of the effects to Gila topminnow from the proposed project must consider the existing tenuous status of the species and its habitat in Redrock Canyon.

Livestock grazing in the watershed has resulted in reduction of ground cover, soil erosion, and degradation of the riparian vegetation. Degradation of the watershed has resulted in faster runoff with resultant higher flood intensities, lowered base flows, and widening of the stream channel. Livestock use of the stream banks has eroded the banks and reduced riparian density and reproduction, resulting in wider, shallower, more braided stream channels with less shade and consequent higher water temperatures. Erosion in the watershed and on the streambanks has resulted in increased movement of sediments into the stream channel. The aquatic habitat in Redrock Canyon has lost a substantial proportion of its original

complexity, particularly in the downstream reaches. These changes in the watershed have negatively affected Gila topminnow.

Development of impounded water in stock tanks in the upper reaches of the watershed has created opportunities for stocking of nonnative fishes, such as largemouth bass, bluegill, and mosquitofish. These nonnative species are detrimental to Gila topminnow through predation and competition. Largemouth bass is found in Cott Tank and the drainage below that tank. Mosquitofish is also found in Cott and Down Under Tanks and throughout the watershed. Other tanks in the drainage have not been sampled and may be the source of other nonnative species. Although flooding seems to limit the distribution and abundance of nonnative fishes in Redrock Canyon, it does not eliminate them. Gila topminnow are depleted or absent from the areas inhabited by those nonnatives.

Development of roads in the canyon has resulted in destruction of streambanks and channel erosion in Redrock Canyon. This is most apparent in the Cott Tank drainage above Silver Tank, but has also occurred elsewhere. General recreational use of the area is presently light to moderate, but appears to be increasing. During site visits to the Redrock Canyon over the past four years, FWS biologists have observed increasing use of the roads in the canyon bottom.

Numerous mining claims and inactive mines are located in the Redrock Canyon watershed. Although having occurred primarily in the past, this activity has contributed to the instability of the watershed and the stream channel. If existing mining claims in the watershed become actively developed, the survival and recovery of Gila topminnow in the drainage could be seriously threatened.

The environmental baseline used for this biological opinion assumes completion of implementation of the June 1990 Redrock Action Plan prior to opening of the Canelo Pass to Patagonia segment of the Arizona Trail. This analysis of expected Arizona Trail effects is based upon the improved watershed, stream, and riparian conditions expected to result from implementation of the Redrock Action Plan. Failure to successfully implement that plan prior to the opening of the Canelo Pass to Patagonia segment of the Arizona Trail would invalidate the following analysis and therefore, the conclusion of this biological opinion. The livestock grazing management called for in the Action Plan must be in operation, the road closures in place, and the four livestock exclosures in place prior to opening of the Arizona Trail through the canyon. Failure to complete these actions prior to opening of the Canelo Pass to Patagonia trail segment, or failure or inability to maintain that management or those structures, would alter the effects of the Arizona Trail on Gila topminnow. This would constitute new information on the project and its effects to the listed species and would require reinitiation of formal section 7 consultation on the Arizona Trail.

Direct and Indirect Effects of the Proposed Action

The effects to Gila topminnow from the presence and use of the Arizona Trail in the bottom of Redrock Canyon are difficult to predict with precision. The type and degree of effects would be dependent upon the level of use the trail receives, the type of user, and the behavior of the users. The ability or inability of the Forest Service to patrol and

maintain the trail and enforce regulations and restrictions would also have a large influence on the effects that would occur. Once the trail is in place and in use, it would be difficult or impossible to re-route or close this segment. Therefore, some of the trail's effects would be irreparable.

The most basic question in this analysis is what level of use the Arizona Trail in general, and the Canelo Pass to Patagonia segment in particular, would receive. The estimate in the BE of 300 to 1,728 persons per year reflects the uncertainty of the answer. We do know that the Patagonia area is a relatively popular recreational area. It is within one-half to three hours of the metropolitan areas of Tucson, Phoenix, and Nogales. Recreational campers and hunters are common in Harshaw and Redrock Canyons and mountain bicyclists are often seen in the upper Meadow Valley Wash area (personal observations of FWS staff). The Arizona Trail would receive an elevated level of publicity and may become widely known. Interest in Redrock Canyon is increasing, particularly among conservation oriented recreationists, and this increase is expected to continue (Jeanne Wade, U.S. Forest Service, pers. comm., October 15, 1992).

The Canelo Pass to Patagonia segment would offer several desirable features that other segments of the trail in this area may not offer. It follows a riparian corridor with corresponding higher levels of wildlife and aesthetic attractions. It would not be a strenuous hike; although there are elevational gains and losses at each end of the trail, the majority of the segment would be nearly level walking/riding. And, it offers several options for day and weekend trips. Multiple entry/exit options would exist at both ends. The eastern end could be accessed at Canelo Pass, at the segment end. It could also be accessed via FR 765 in the Cott Tank drainage, although this would require a high-clearance vehicle. For those wishing a short trip, access would be available anywhere along the four-wheel drive vehicle track that would remain open to motorized vehicles between Meadow Valley and Red Bank Well in the center of the segment (FR 4630 to 4632 to 765). The western end could be accessed via the trail head in Harshaw Canyon (FR 58) or by the existing high-clearance road up Redrock Canyon from Patagonia (FR 138). For mountain bicyclists, the possibility exists for a one-day or overnight round trip without traversing any paved roads. These factors lead us to anticipate use increasing to the high end of the estimate.

Effects of recreation on stream channels tend to be localized, but even localized damage can be a serious concern with an endangered species. Due to the restriction of Gila topminnow to the watered areas of the canyon and the innate human attraction to water and riparian areas, recreation use and habitat of Gila topminnow are very likely to overlap along the proposed trail. Expected effects would vary among the three areas of perennial habitat and the connecting intermittent habitat. The configuration of the sites, the status of the population of Gila topminnow in each area, and the proximity of each area to the trail would influence how the trail effects the species.

Cott Tank Drainage - The majority of this area will be included within the livestock exclosure provided for by the Redrock Action Plan. As detailed in the Environmental Baseline section of this document, we will assume the presence and maintenance of that exclosure in this analysis of effects. The exclosure will prohibit motorized vehicular use of FR 765 in the Cott Tank drainage. The exclosure is expected to result in

stabilization of streambanks, reduction of sedimentation, and increased density and species composition of riparian vegetation.

The Arizona Trail would not run through the Cott Tank drainage, but would enter the watershed through Redrock Canyon proper, via Down Under Tank. However, at present the most commonly used entry into upper Redrock Canyon is the Cott Tank drainage and this access point may also prove to be popular with trail users. The existing road will end at the upper exclosure fence but the roadbed within the exclosure would provide a usable trail to hikers, bicyclists, and riders. The exclosure will have walk-through entrances at both the upstream and downstream ends. These entrances would accommodate hikers and probably not impede mountain bicyclists. As the riparian vegetation within the exclosure recovers, the area may become increasingly attractive to recreational users. This may draw trail users into the exclosure from both ends.

The Cott Tank drainage below the spring in the NE1/4 sec. 21, T .22 S., R. 17 E. supports a healthy, relatively stable Gila topminnow population. Between 1987 and 1992, Gila topminnow has comprised 38 to 100 percent of the topminnow/mosquitofish community in this area. Although both largemouth bass and mosquitofish are present in this area, Gila topminnow are always common (Simons 1987, Bagley et al. 1991, FWS unpublished data).

Gate Spring - Gate Spring is not a discrete spring. It is a reach of perennial flow in the stream channel formed when subsurface flow is pushed to the surface, apparently by a bedrock constriction. Perennial flow is short; in June 1989, surface flow was approximately 1,500 feet (Stefferud 1989). At Gate Spring, the proposed Arizona Trail route would climb the hill on the north side of the stream to detour around the spring area. The purpose of the detour is to minimize effects to Gila topminnow and to cultural resources. Gate Spring will be within a livestock exclosure constructed as part of the Redrock Action Plan. This exclosure is expected to increase the diversity and density of riparian vegetation and increase the stability of the channel. One or more walk-through gates will be present in the exclosure fence.

Trail effects are expected to be the most pronounced at Gate Spring. Because Gate Spring is the only surface water in the central portion of Redrock Canyon, it is an attractive place for comfort, aesthetics, and watering and corraling of horses and packstock. There is interesting, well-preserved, prehistoric rock art at Gate Spring. The water, shade, beauty, and archeological interest are likely to attract trail users into the exclosure. Given a choice of proceeding along the canyon on a relatively flat stream bottom or detouring up and then down a dry southern-exposure hillside, it is likely that some portion of the trail users would chose to cut through the exclosure. This is most likely to occur with hikers, but may also include some bicyclists. Construction of a side trail to the rock art site would lead trail users directly into the exclosure. The rock art is located on a rock face just above the stream.

Gate Spring is the most vulnerable of the three concentrations of Gila topminnow in Redrock Canyon. It is small and the channel is closely confined by canyon walls. Although it consistently supports Gila topminnow and few to no mosquitofish, the population of Gila topminnow undergoes higher fluctuations than in the Cott Tank drainage (Simons 1987, Bagley et

al. 1991, FWS unpublished data). This is apparently due to the present instability of the stream channel.

Falls (below Redrock Ranch) - The perennial flow in the Falls area will also be within an exclosure constructed under the Redrock Action Plan and will also have walk-through gates. As with the other two sites, this area is expected to develop a denser, more complex riparian vegetative community and a higher degree of channel stability and complexity following exclusion from livestock use. The proposed route for the Arizona Trail would cross the stream at the upstream end of the exclosure. It is likely that a portion of the trail users would enter the exclosure to enjoy the riparian area, to sit in the shade and cool their feet in the water, to birdwatch, and to see the falls at the lower end of the exclosure. A no-camping zone would be established inside the exclosure and along the canyon bottom above the upstream exclosure fence. However, the hillside to the north offers several bench areas suitable for camping. This may become a popular camping area for weekend trail users who arrive at the Harshaw Road parking area on Friday night and drop over the hill into Redrock Canyon to seek a camping site.

The population of Gila topminnow in the Falls area is the least stable of the three concentrations in the canyon (Simons 1987, Bagley et al. 1992, FWS unpublished data). Since 1987 it has fluctuated from very abundant to such low levels that no topminnow can be located. Mosquitofish are generally rare at this site. Longfin dace (Agosia chrysogaster), the other native fish present in this area, also shows marked population fluctuations, apparently due to the highly unstable nature of the stream channel in this area. The wide channel bottom with grassy benches on both sides make this area less vulnerable to damage from recreational use, but conversely make it more attractive for campsites and corraling of livestock.

Intermittent Habitats - Stream segments between the perennial reaches support Gila topminnow during some portions of the year. These intermittent habitats are important in the life history of Gila topminnow. Gila topminnow are a short-lived species with an extremely high capacity for reproduction. Individuals live only a year and, in non-thermal habitats like Redrock Canyon, reproduce from early spring to early winter. They rapidly colonize new areas of suitable habitat. Their ability to rapidly build large populations enables them to exploit areas of short-term habitat such as intermittent stream areas. Populations boom and crash in response to short-term availability of suitable habitat. The large populations during periods of expanded habitat provide various genetic and ecological needs of the species (Meffe and Snelson 1989).

The intermittent reaches of Redrock Canyon are subject to extensive livestock impact and some areas are used by motor vehicles. Improved aquatic and riparian conditions are expected to result from changes in livestock grazing management in these areas under the Redrock Action Plan. Increased recreational use of these areas may have little additional impact. Intermittent areas of particular concern are those reaches at the downstream end of the perennial flow. These areas may sustain substantial flow in some years and some seasons, and may provide extensive habitat for Gila topminnow during those periods. Gila topminnow is commonly found up to one-half mile below the downstream ends of the Cott Tank and Falls exclosures and a few hundred feet below the Gate Springs exclosure. They

are also sometimes found in isolated pools above the upper end of the Falls exclosure.

While the stream channel below the Falls exclosure would not likely experience effects from the proposed trail, the downstream ends of the Cott Tank and Gate Springs exclosure would be affected, as would the upstream end of the Falls exclosure. The proposed no-camping zones at the downstream end of the Cott Tank exclosure and the upstream end of the Falls exclosure would help minimize adverse effects.

Few studies have addressed the effects of recreation on fish, particularly small desert fishes. However, observation of other desert riparian areas in Arizona, such as Seven Springs/Cave Creek on the Tonto National Forest, illustrate the potential impacts (FWS staff personal observations 1991-92). Where recreational use is concentrated on the streambanks, effects include sedimentation, bank destabilization, changes in channel morphology, riparian vegetation destruction and reproductive loss, soil compaction, and pollution (Clark and Gibbons 1991). Where horse and packstock are used, these effects tend to be more severe. Areas of small, shallow flow, such as Gate Spring, are also often subject to channel and substrate modification when recreational users attempt to construct pools for bathing and play.

Horses and packstock would create effects apart from those of other recreational users. Small, fenced areas, such as the Redrock Canyon exclosures, provide a convenient corral for pasturing of horses and packstock. Use, either accidental or intentional, of the interior of exclosures by livestock is a common problem in achieving the goals of such exclosures (John Rinne, U.S. Forest Service, pers. comm., December 15, 1992). Overnight users of horses and packstock on the trail in Redrock Canyon would need water for their stock. The stream contains the only available water along the trail and during dry periods the only available water would be located inside the exclosures. Few livestock water developments exist along the valley bottom. Silver Tank has been replaced by a well up on the ridge. Red Bank and Redrock wells are to be rehabilitated under the Redrock Action Plan, but are likely to be kept in operation only during the portion of the year (November to February) that cattle are present in the stream-bottom pastures. Watering of riding and packstock in water supporting Gila topminnow could create substantial adverse effects to Gila topminnow and their habitat, particularly inside the exclosures. These effects would be similar to existing effects from livestock grazing, including erosion of streambanks, destruction of riparian vegetation, increased sedimentation, altered channel morphology, changes in water chemistry and temperature, and decreased habitat complexity.

A number of potential adverse effects to Gila topminnow would come from uses that are not part of anticipated use patterns or which are in violation of protective regulations. Such things as trailing into Redrock Canyon through the Cott Tank exclosure, or trail use through the Gate Tank exclosure rather than up the hill, are not anticipated and would not be prohibited. At low levels these activities would have minor effects on Gila topminnow and are an acceptable use of the exclosures. However, if such uses become a major portion of the use pattern, serious adverse impacts to topminnow could result. It would be very difficult to regulate the level of such use. Prohibited activities, such as camping in the no-

camping zones or corraling and watering of horses and packstock in the exclosures would be prohibited, but would be very difficult to prevent. The proposed action does not provide for enforcement of prohibited actions and does not provide for an active Forest Service presence to direct trail use in the least damaging ways. Given existing and projected Federal budgets, it is likely that Forest Service patrols of the area would be minimal and enforcement of the proposed protective measures would be limited.

Exclusion of livestock from riparian areas in the Southwest often has an unintentional side effect of increasing the probability of damaging wildfires. The increased ground cover and understory vegetation within ungrazed riparian zones provides increased likelihood for a fire to spread and burn hotter. Many woody riparian species, such as cottonwood, do not have a high tolerance for fire. The increased risk from natural fire is usually acceptable given the overriding benefits of healthy, ungrazed, riparian vegetation. However, when overnight recreational use is added, the risk of fire increases substantially. Many fires are started by campers. The Bureau of Land Management is currently facing this issue on the upper San Pedro River (Mark Fredlake, USBLM, pers. comm., April 23, 1992). A fire in the riparian zone of any of the perennial stretches of Redrock Canyon may have serious adverse impacts to Gila topminnow. Although little information is available on the effects of fire on desert fish, it is known that fire can have substantial adverse impacts to fish communities (Propst et al. 1992, Rinne and LaFayette 1991).

Cumulative Effects of the Proposed Action

Cumulative effects are those effects of future non-Federal (State, local government, or private) activities on endangered or threatened species or critical habitat that are reasonably certain to occur during the course of the Federal activity subject to consultation. Future Federal actions are subject to the consultation requirements established in section 7 and, therefore, are not considered cumulative in the proposed action.

As in most endangered fish issues, cumulative impacts are an important consideration in the analysis of potential effects of the proposed Arizona Trail. Gila topminnow in Redrock Canyon is already subject to a number of adverse effects, primarily from watershed degradation by livestock grazing, roads, and historic mining. The June 1990 Redrock Action Plan sets in motion a series of actions designed to alleviate some of those adverse effects. Some of that anticipated improvement would now be offset by adverse impacts from the Arizona Trail. This may not threaten the short-term survival of Gila topminnow in Redrock Canyon, but may impede its recovery and therefore its long-term survival.

There are few non-Federal actions in the Redrock Canyon watershed. Only two privately owned parcels of land are located within the watershed. One of those is located around Cott Tank at the head of the Cott Tank drainage. Uses on this parcel currently consist of cattle grazing, water development for livestock watering, and fishing. No anticipated change in this use is expected. Adverse impacts to Gila topminnow come from the introduction and continued presence of nonnative fish species in Cott Tank. The second privately owned parcel is the Redrock Ranch, which is currently used for livestock grazing. A house is present. The owners live in Patagonia and visit the ranch daily. No change in this use is anticipated in the near

future. Grazing of horses and cattle along the stream in the Redrock Ranch has adverse impacts to the stream and to the Gila topminnow downstream in the Falls area.

Other non-Federal actions in the Redrock Canyon watershed include monitoring of Gila topminnow by the AGFD and as part of the Fall Fish Count. These actions are cumulative to the monitoring of Gila topminnow and the aquatic and riparian habitats as part of the proposed action, and to the monitoring of Gila topminnow and riparian vegetation as part of the Redrock Action Plan. We believe that monitoring of listed species is an important component of a successful conservation program. However, it is important that all monitoring efforts be coordinated to avoid unnecessary harassment of the species and damage to its habitat. Cumulative impacts of several uncoordinated monitoring programs, particularly when combined with the adverse impacts of the other resources uses, may result in adverse impacts to Gila topminnow and its habitat.

INCIDENTAL TAKE

Section 9 of the Act, as amended, prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish and wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered a prohibited taking provided that such taking is in compliance with the incidental take statement. **The measures described below are nondiscretionary, and must be undertaken by the agency or made a binding condition of any grant or permit issued to the applicant, as appropriate.**

Incidental take from the proposed Arizona Trail may result indirectly through habitat modification or degradation. The level of incidental take anticipated cannot be quantified in terms of numbers of individual Gila topminnow. Population estimates of Gila topminnow are not obtainable due to sampling difficulties, and would be of little value due to the rapid population changes inherent in a short-lived, highly fecund species such as this. Measurement of incidental take in terms of habitat damage is also difficult due to the coincident improvement in riparian and stream conditions as a result of the exclosures being constructed under the Redrock Action Plan. Incidental take from the Arizona Trail would occur as a retardation of the trend and extent of that improvement rather than a degradation of the existing condition. No data are available on the pre-grazing condition toward which the riparian and aquatic systems are expected to shift following removal of livestock grazing from the perennial water areas, thus measurement of the loss of improvement is not possible.

While the numbers of fish or amount of habitat that will be taken cannot be quantified, there are certain levels of effects which we believe will result in take higher than that anticipated. Therefore, incidental take of Gila topminnow and their habitat as a result of the construction and use of the proposed Canelo Pass to Patagonia segment of the Arizona Trail would be assumed to have been exceeded if one or more of the following occurs:

1. A recreation-attributable fire occurs in the riparian zone;

2. Corraling of horses and packstock in any of the three exclosures occurs, or if persistent evidence of livestock grazing is present within any of the exclosures;

3. A distinct user trail (exposing or maintaining bare soil) develops along the stream bottom of Gate Spring exclosure;

4. Evidence of persistent violation of no-camping restrictions is present; or

5. An annual interagency review finds that cumulative habitat modification and degradation resulting from the trail and its users is resulting in effects to Gila topminnow greater or in a different manner than anticipated by this biological opinion. If, as a result of the review, the damage is judged to exceed acceptable levels, then anticipated incidental take will be assumed to have been exceeded.

If, during the course of the action, the amount or extent of the incidental take limit is exceeded, the Forest Service must reinitiate consultation with the FWS immediately to avoid violation of section 9. If it is determined that the impact of the additional taking will cause an irreversible and adverse impact on the species, trail use must be suspended in the interim period between the initiation and completion of the new consultation.

Reasonable and Prudent Measures

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental taking authorized by this biological opinion.

1. Conduct all proposed actions in a manner which will minimize direct mortalities of Gila topminnow.

2. Conduct all proposed actions in a manner which will minimize modification and degradation of Gila topminnow habitat.

3. Maintain complete and accurate records of actions which may result in take of Gila topminnow and their habitat.

4. Monitor Gila topminnow and their habitat to document levels of incidental take of fish or their habitat.

Terms and Conditions for Implementation

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service is responsible for compliance with the following terms and conditions which implement the reasonable and prudent measures described above.

1. The following terms and conditions will implement reasonable and prudent measure 1.

1.1 Any trail construction or maintenance work shall use all reasonable means to minimize disturbance of and work within the stream channel of Redrock Canyon.

1.2 Trail construction and maintenance work shall be conducted in a manner to ensure that no pollutants enter perennial or intermittent stream channels within Redrock Canyon watershed.

2. The following terms and conditions will implement reasonable and prudent measure 2.

2.1 The no-camping restrictions proposed along the Arizona Trail shall be actively enforced.

2.2 The livestock exclosures in the Cott Tank drainage, at Gate Spring, and at the Falls shall be inspected and maintained at least twice a year.

2.3 The Coronado National Forest shall conduct an annual interagency review of the effects of the Arizona Trail on the riparian corridor, stream channel, and Gila topminnow. This review shall include FWS, AGFD, and Forest Service biologists. Academic biologists knowledgeable about the species may also be included at the discretion of the Forest Service. This review shall assess proximate and cumulative impacts to the Gila topminnow from the Arizona Trail and its users. A written report of the conclusions of the review shall be prepared and made available to all review participants within 3 months following completion of each annual review.

3. The following terms and conditions will implement reasonable and prudent measure 3.

3.1 A written record of the construction of the Canelo Pass to Patagonia segment of the Arizona Trail shall be maintained. This shall include project plans, maps, construction specifications, and description of any changes from proposed plans during actual construction.

3.2 A comprehensive written record shall be maintained documenting all information on use and maintenance of the Canelo Pass to Patagonia segment of the Arizona Trail. This record shall include data from the traffic counters at Silver Tank and the Harshaw/Redrock divide, any other use information available, records of any trail or exclosure maintenance conducted, records of any violations of no-camping restrictions observed or prosecuted, observations on any livestock use inside the exclosures, and any other information pertinent to assessing the level of incidental take.

3.3 The records described in items 3.1 and 3.2 shall be sent to the FWS and AGFD annually, accompanied by a summary.

4. The following terms and conditions will implement reasonable and prudent measure 4.

4.1 The Coronado National Forest shall monitor the effects of the Arizona Trail on the riparian and aquatic habitats and on Gila topminnow. This monitoring shall be coordinated with existing monitoring of the AGFD, Fall Fish Count, and Redrock Action Plan. Monitoring protocols for riparian and aquatic habitats and for Gila topminnow shall be developed in coordination with the FWS and AGFD and require the approval of both agencies prior to implementation.

4.2 Monitoring shall be initiated at least 6 months prior to opening of the Canelo Pass to Patagonia segment of the Arizona Trail to gather baseline data.

4.3 Monitoring shall be continued as long as the trail is in active use. The level and frequency of monitoring shall be specified in the monitoring protocol developed under item 4.1.

4.4 Monitoring reports shall be submitted to the FWS and AGFD on an annual basis.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term conservation recommendations has been defined as FWS suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibility for these species.

For conservation of Gila topminnow, the FWS recommends the Forest Service select alternative 8, the Lampshire Canyon alternative, for the Canelo Pass to Patagonia segment of the Arizona Trail. Alternative 8 would avoid nearly all anticipated impacts to Gila topminnow. This route would start at the same point on Canelo Pass as the preferred alternative. However, rather than descending into the Redrock watershed through Redrock Canyon proper, it would enter through Lampshire Canyon, a northern tributary to Redrock Canyon (Figure 2). Alternative 8 would avoid both the Cott Tank drainage and Gate Spring Gila topminnow concentration areas, thus avoiding trail effects in those areas.

Lampshire Canyon joins Redrock Canyon proper just upstream from Redrock Ranch. The preferred alternative would leave the valley bottom at this junction and climb the hill on the north side of the valley, skirting the northern boundary of Redrock Ranch. Alternative 8 merges with the preferred alternative route about one-quarter to one-half mile upstream from the junction of Lampshire and Redrock Canyons. Alternative 8 would cross Redrock Canyon only at the upper end of the Falls exclosure, just before it crosses into Harshaw Canyon. The only effects to Gila topminnow from the Arizona Trail under alternative 8 would be in the Falls area, where trail effects are expected to be minimal.

Alternative 8 was not selected based on four primary considerations (Jeanne Wade, U.S. Forest Service, pers. comm., October 15, 1992). The four considerations include:

1. Lampshire Canyon offers less aesthetic benefits than the bottom of Redrock Canyon proper;

2. the Lampshire route would require greater disturbance of currently undisturbed ground and more new trail construction, with resulting higher costs, than the preferred alternative;

3. riparian resources in Lampshire Canyon would be adversely affected by a trail through that area; and

4. the Forest Service expects significant future increases in recreation use in the bottom of Redrock Canyon proper, with or without a trail. Given this expectation, construction and maintenance of a designated trail in the valley bottom would allow better control and management of the use.

No private lands would be affected by selection of alternative 8.

While the FWS understands the multiple use framework within which the preferred alternative was selected, we believe the reasons for not selecting alternative 8 are insufficient to justify the imposition of adverse impacts on an endangered species. Biologists from FWS have hiked the lower two-thirds of Lampshire Canyon. Lampshire Canyon, while different from Redrock proper, offers a great deal aesthetically, although existing livestock impacts detract from those values. Perennial water is present at the Cottonwood Springs area which would provide adequately for horse and packstock watering needs. Water is also intermittently present at the narrows in the NE 1/4 sec. 6 (T. 21 S., R. 17 E) and at the concrete dam and non-functional livestock water development in the SW 1/4 sec.6 (T. 21 S., R. 17 E.). A distinct livestock trail is already present in Lampshire Canyon, thus construction of a new trail would not result in significant new disturbance, except where the trail would cross over the ridge in the NE 1/4 Sec. 6 to avoid the canyon narrows. An existing vehicle track is present in the upper end of Lampshire Canyon.

Riparian resources in Lampshire Canyon, below Box Canyon, are sparse and are heavily impacted by livestock. Riparian vegetation consists primarily of seepwillow (Baccharis sp.) with scattered ash (Fraxinus sp.). One small (15-20 feet) cottonwood (Populus sp.) is present at Cottonwood Spring.

The anticipated increase in recreational use in the bottom of Redrock Canyon may pose future problems in overall management and protection of Gila topminnow. However, we do not believe that encouraging even greater increases in use by construction of a widely promoted trail would alleviate those problems. Construction and advertisement of a maintained trail through Lampshire Canyon would help reduce the increasing use in Redrock Canyon proper.

Selection of alternative 8 would allow optimum results from Gila topminnow habitat protection resulting from implementation of the Redrock Action Plan. It would allow the Arizona Trail to be placed in the Redrock watershed without substantial adverse effects to Gila topminnow.

Therefore, the choice of alternative 8 would appear to offer fulfillment of the objectives of the Arizona Trail, while furthering the conservation and recovery of Gila topminnow.

In order for the FWS to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

CONCLUSION

This concludes formal consultation on the actions outlined in the September 11, 1992, biological evaluation and consultation request. As required by 50 CFR 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

If we may be of further assistance, please contact Sally Stefferud or me.

Sincerely,

Sam F. Spiller
Field Supervisor

cc: Director, Arizona Game and Fish Department
Regional Director, Fish and Wildlife Service, Albuquerque, NM (AWE)
Director, Fish and Wildlife Service, Washington, D.C. (HC)
Forest Supervisor, Coronado National Forest, Tucson, AZ
District Ranger, Sierra Vista Ranger District, Sierra Vista, AZ

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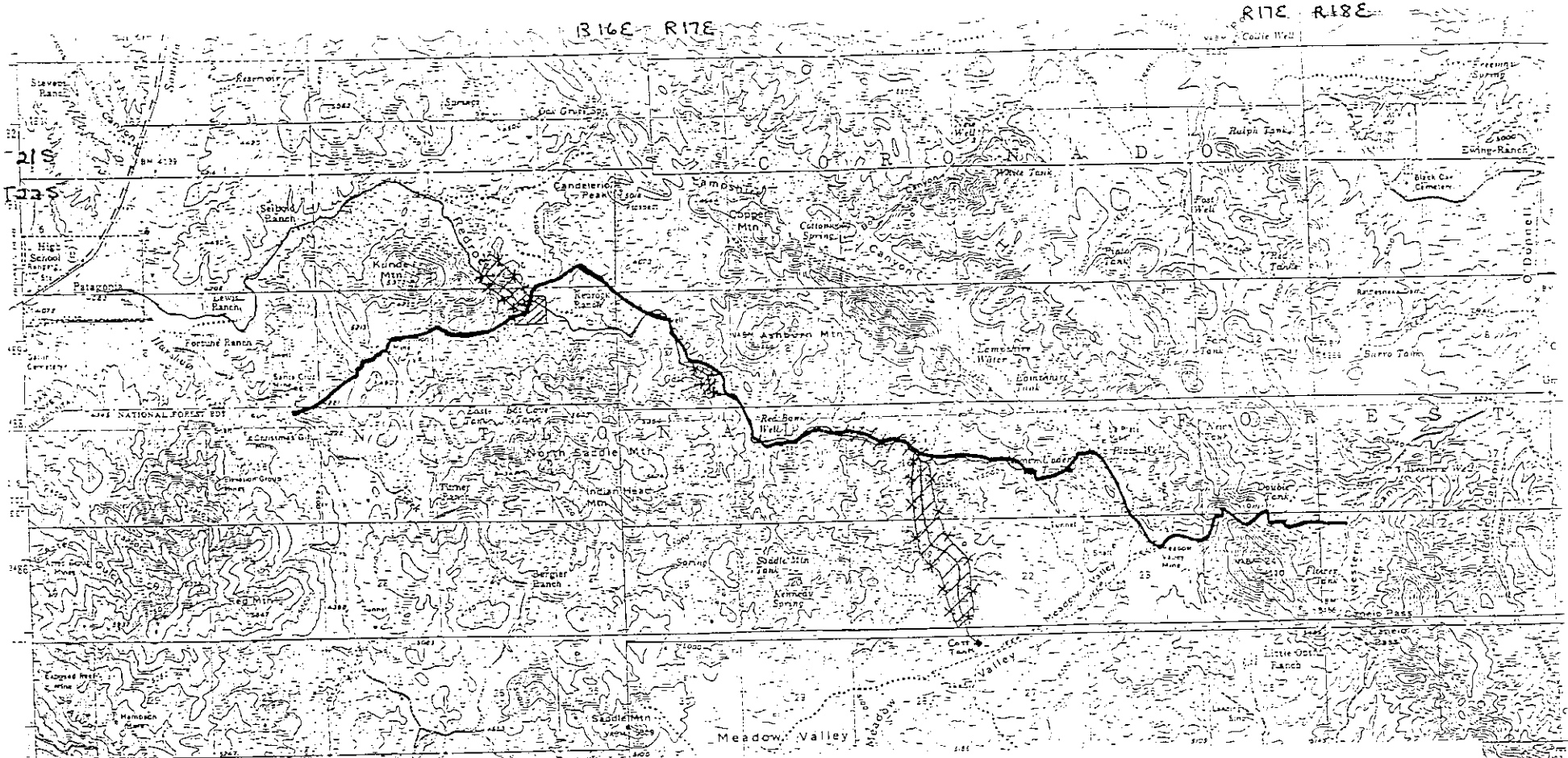

FIGURE 1.

ARIZONA TRAIL - CANELO PASS TO PATAGONIA
SANTA CRUZ COUNTY, ARIZONA

PREFERRED ALTERNATIVE

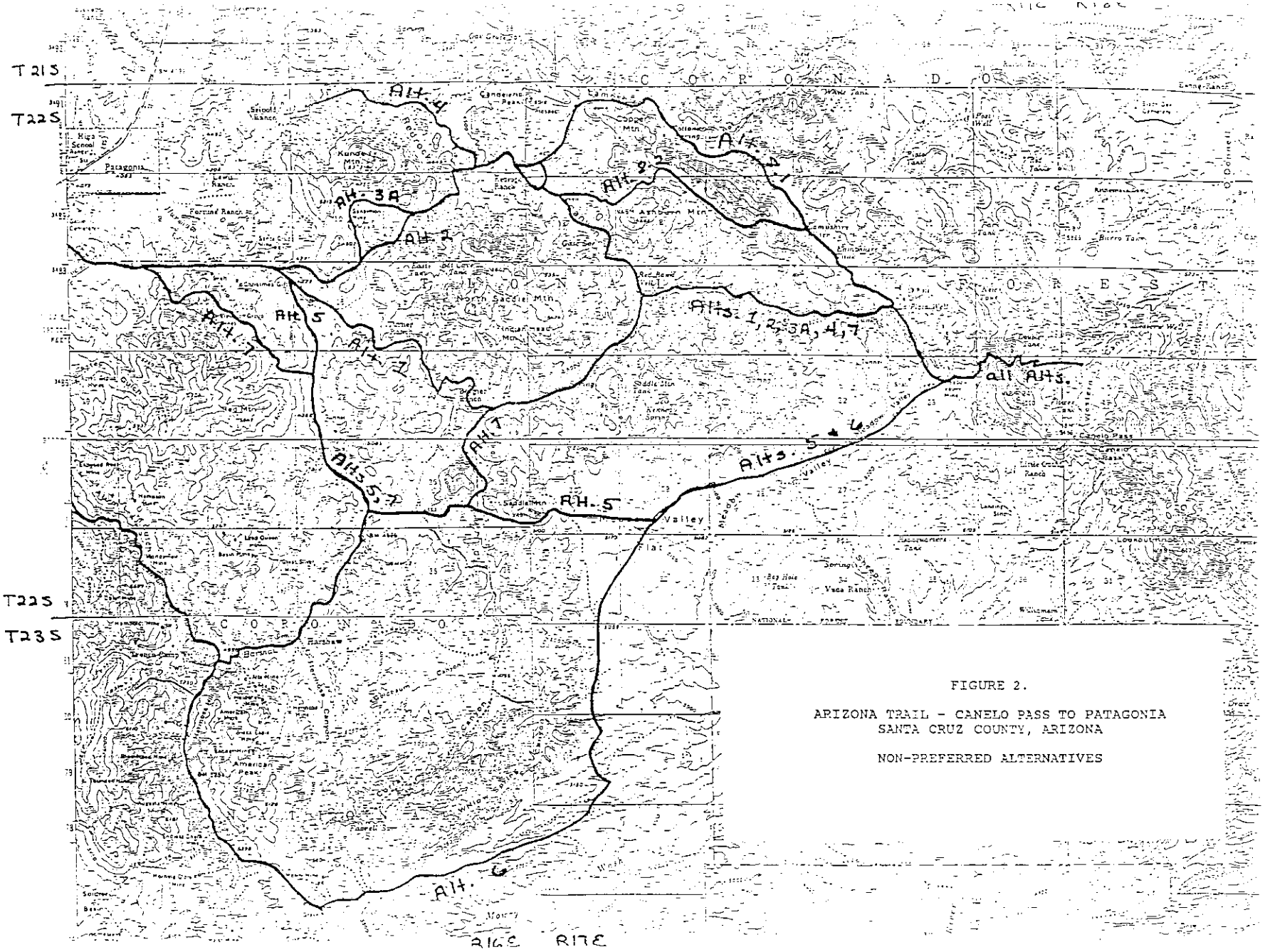

FIGURE 2.

ARIZONA TRAIL - CANELO PASS TO PATAGONIA
SANTA CRUZ COUNTY, ARIZONA

NON-PREFERRED ALTERNATIVES